

## Discrete Structures for CS Exam #2 Study Guide

Review homework 5-7. Try similar odd-numbered problems at the end of each section; their solutions are at the end of the book. When in doubt of a problem or solution, ask.

Expect questions of the following type:

- Given a statement involving sets in propositional logic, express it in English (and vica verca)
- Given one or more sets, find
  - union
  - intersection
  - complementation
  - difference
  - cardinality
  - cartesian product
  - power set
- Draw a Venn Diagram for some sets
  - use it to show relationship between sets (if one is a subset of another or they are equal)
- Know important sets ( $Z$ ,  $N$ ,  $R$ )
- Know what it means for an integer to be positive, non-negative, negative, or non-positive - they are all different.
- Given a sequence, use forward or backward substitution to conjecture a closed formula which describes the  $n$ th term of that sequence
- Given a recurrence formula or closed formula, find the first  $n$  terms of the sequence it describes
- Given one or more functions
  - find the result of that function at some value (for example, find  $f(5)$ )
  - provide the domain and range
  - determine if it is surjective/injective/bijective
  - if it exists, find its inverse
  - find the composition of the functions
  - find the  $n$ th term for a recursively defined function
- Find the value of a function which uses ceiling, floor, or factorial
- Find the summation over some sequence
- Define a function/set recursively
- Proof techniques
  - Mathematical induction
  - Structural induction (understand example on slides and from the homework)
  - Prove two sets are equal using
    - membership table
    - containment proof (left is a subset of the right and right is a subset of left)
    - set builder notation and propositional logic